used for the prostate. The prostate was the target for the cancer type in this case. The ICRP references and IMBA do not have prostate listed as a specific target organ, so in these instances we choose surrogate organs, and it's not always the same surrogate for internal versus external exposure. At the time the dose reconstruction was done the surrogate organ we were using for the prostate was the testes, but the organ for the internal exposure is highest non-metabolic, that's used for the prostate for internal exposure. So it's not the testes in every case. But it was the testes for external exposure at the time this one was done.

It seems that in reading there's a sentence in the dose reconstruction that says the testes were used as the surrogate organs for external exposure. It may not clearly state what was used for the internal surrogate. I don't recall exactly whether it states it or not. But highest non-metabolic is the standard target organ for internal dose for the prostate. That's what we used in every

case. So we did want to make that point that the external dose surrogate was the testes, and the internal, and the highest non-metabolic was considered the colon, which is the common default for highest non-metabolic, so the colon was actually the target organ for the internal, the surrogate that was used for the internal dose.

**DR. H. BEHLING:** In looking at it now we kind of agree, but let me just make a couple of points here. When we first looked at that worksheet, which is very nice and very simple to use, internal code that allows you to simply enter the period of time, the exposure, and gives you a quick assessment for a hypothetical internal exposure. It's very difficult at times to identify the proper surrogate for tissues -- or organs that are not listed, and actually since Kathy is my computer expert here I didn't do it but she can perhaps talk about it. She had to go through each and every one of the organs to figure out which one was the highest one. And if you do in fact select testes, you get a dose of 25 rem, which is

more than double the assigned colon dose as a surrogate and I think what this individual -- I didn't do this particular review -- he must have obviously taken the testes and realized the dose was considerably higher than the assigned value of 12. Since that time this particular worksheet has been amended again to now include the prostate, so you'll have to use a surrogate organ and of course under the new approach and revised, amended worksheet where you can enter the prostate as the target and not have to worry about selecting a surrogate, the dose is now reduced to 10.5 rem which is almost two rems less than the surrogate value of the colon, so again we're talking about a dynamic system here that gets amended by the day and sometimes gets to be very confusing to people who say well, better check to see whether or not a new organ has been added to the worksheet. Obviously the need for surrogate organ tissue. And I guess this is the reason why we had initially the concern about the use of testes -- It wasn't clear actually why

testes are considered metabolic, but I guess spermatogenesis may have something to do with higher uptake of radionuclides, are part of the list of nuclides under the hypothetical case, and therefore there is some metabolic uptake that exceeds other tissues in question. So again, our reviewer probably wasn't aware of some of these nuances and selected testes, which we admit is the wrong one. But in most recent times we can now run prostate as its own organ of concern.

**MR. HINNEFELD:** You said that very well -- I mean there are certainly nuclides in (unintelligible) component of some type (unintelligible) testes. And so because of that the testes dose has been quite a bit higher than the non-metabolic organs. And as you said a hypothetical (unintelligible) nuclide intake, so top of those do in fact have some uptake in (unintelligible).

**DR. H. BEHLING:** So I think we have to amend that and assume our assessment was wrong. We will acknowledge the fact that as of today we do have the prostate as a organ

that no longer requires the use of the surrogate tissue, for future assessments.

**MR. HINNEFELD:** Issue Number Three is the intentional overestimate of the medical exposure. Again -- Number two was the issue we just talked about, right?

**DR. H. BEHLING:** Yes.

**MR. HINNEFELD:** Number two was the issue of the testes as the -- Well, we kind of went into -- One and two are sort of --

**DR. H. BEHLING:** Yes, one and two are pretty much the same.

**MR. HINNEFELD:** Issue Number Three is the again the intentional overestimate by choosing an organ dose, a maximizing organ dose for medical exposure rather than the true target dose we talked about on several cases.

And Issue Number Four --

**DR. H. BEHLING:** Let me just comment --

**MR. HINNEFELD:** Again? We haven't talked about this enough?

**DR. H. BEHLING:** I know. But here we just wanted to point out the differences in values because I did look at the Catherine

report and came to the realization that Catherine will tell you that the dose for the testes is 1.0, each (unintelligible) six rem which will give you one one-thousandths of a millirem. And just basically just forget it, you know, and here we assigned a total of 83 millirem that was subsequently also multiplied times 1.3, so we're talking about the difference between a hundred rem versus one one-thousandth of a millirem. And again the question is should we use something that is so outrageously different by orders of magnitude?

**MS. MUNN:** No.

**MR. HINNEFELD:** Right, I know we had talked about it. Maybe now we've talked about it enough. Okay, Issue Number Four on Case 20 is the same issue as Case Number 16 where we had the discussion about the factor of two for those of you -- Yeah, factor of two, you apply the factor of two where (unintelligible) chose a missed dose. It's the same issue that we talked about there. I want to when you get back look at the procedure, I'll probably call Hans so we can

understand you know where are we reading the various things in the procedure and try to get an understanding of that.

**DR. H. BEHLING:** Except this one was the OTIB0008, where the last one was OTIB0010, one was film, one was TLD, and they misused and misinterpreted that table. I think it needs to be stated that the CC, or conversion correction factor of two only applies to recorded dose and not to be used in combination with LOD and the monthly cycle --

**MR. HINNEFELD:** The way that table is laid out would probably lead someone to see that table as (unintelligible) after reading this whole big confusing thing, okay here it is. But the table is laid out in contradiction of what he says.

**DR. H. BEHLING:** Yes, if you read the preceding paragraphs, it clearly states that the CC or conversion correction factor of two is to be applied to measured dose, it has nothing to do with missed dose. And of course that's a mistake I made too when I first looked at it. I thought you could say

LOD times two, which is four times greater than LOD over two.

**MR. HINNEFELD:** Right.

**DR. H. BEHLING:** So I realized I too was the victim of misinterpreting that thing, but after rereading it multiple times I realize that this error was committed by both of these two guys and in fact they must have been sitting in the same room together because they committed the same errors and used the same words so --

**MR. HINNEFELD:** Well the words, the words actually are boilerplate.

**DR. H. BEHLING:** Oh, is that right?

**MR. HINNEFELD:** They pop up over and over and over (unintelligible) but it's still a boilerplate description.

**DR. H. BEHLING:** Yeah, I think if both TIB-0008 and -0010 are to be used, I think it should be clarified to the world of dose reconstructionists that there's a separation between missed dose and dose of record and that not all of those values and those tables apply to missed dose.

**MR. HINNEFELD:** Well, I want to make sure I

understand exactly the terminology -- I'll be talking to Hans about that so I can understand exactly the point and I'll talk to our guys as well, so we will resolve that one.

**MR. GIBSON:** This is Mike Gibson. I have a question on this one, too. I believe there was some actinium down there, and this person was, based on TIB-002 on this which defines doses as having a single acute inhalation of 28 radionuclides on the first year of employment. You assume that an intake of actinium on the first date of employment what would the potential dose be, and if it is actually a worst case scenario for the dose?

**MR. HINNEFELD:** Well, I don't think actinium is in the 28 -- Actinium is not one of the radionuclides in the 28. I think that the 28 nuclide approach was intended to provide a very large intake. It's a combination of 28 radionuclides that most of which were not at Y-12. And so it's sort of a technique for saying we don't -- we can't say with confidence that this person's internal dose

is zero. We don't have any evidence based on the records we have that he had any internal dose, but we can't say with confidence that he had zero internal dose. So what can we do to kind of bracket it and -- and the doses that result from the the hypothetical intake are really large, I mean these actual dose numbers that come out are for non-metabolic organs, you know, organs don't concentrate, keep materials at all. (Unintelligible) blood and the radionuclides being carried around in the blood, so these -- if you were looking at the target organs for any of these (unintelligible) radionuclides on the list, these would be huge, huge doses. These are big intakes we're assigning. So our feeling is that this kind of intake and this dose outcome provides a lot of confidence that we have bracketed the potential internal doses for people. Even if there may have been a specific radionuclide available in their work place that's not on that list, we don't think that there is a clerical likelihood that there was such a big intake of those

radionuclides that it would be larger than what is calculated by the hypothetical intake. That's kind of the thought process behind this approach.

**MR. GIBSON:** I guess my concern is if you get an actinium exposure and you do a biopsy sample within a few days, the minimum detectable dose you'll see is three to four rem, so if this guy had an acute intake of some actinium on day one, how large could that dose have been?

**MR. HINNEFELD:** Well, the actinium intake dose report on that for that dose within a few days was probably committed effective dose equivalent which would include a component to heavily radiated organs that the person would have, whether that be the lung or -- I don't even know the behavior of actinium right now, but --

**UNIDENTIFIED:** Bone.

**MR. HINNEFELD:** Bone? So (unintelligible) that three rem number you're talking about is (unintelligible) effective number probably is what could be missed by a bioassay program and the bulk, or the

overwhelming, amount of that is based on the dose to the certain metabolic organs. In this particular person's case since the target organ, or the organ where the cancer developed, was (unintelligible) his prostate, even those actinium intakes you're talking about would result in very, very small doses to the prostate, which is the issue we're concerned about for the program here is what was the dose to the targets. And that's why we go through all these convoluted organ dose calculations versus using (unintelligible) effective, which is essentially calculated by regulation. So I understand your point. I can't -- it's not on the 28 nuclide list. I guess our position is that the intake, or the 28 nuclide intake is such a large intake in total that we think we've bracketed the potential exposures that this person could have in their work.

**DR. H. BEHLING:** It might be different if in fact the cancer in question was bone cancer.

**MR. HINNEFELD:** Right, and in fact we don't use typically hypothetical intakes on bone

cancer or lung cancer or kidney cancer, so we don't use the hypothetical -- the hypothetical's really only used for non-metabolic cancer sites.

Well, I've spoken more in the last two days than I normally speak in two weeks, so I don't propose to keep talking.

**DR. H. BEHLING:** I guess we'll go around and see if anybody has any concluding comments, remarks, questions or anything, before we close up and hang up here. Wanda, do you have anything that you want to add to the record?

**MS. MUNN:** Nothing, except to thank all of you for being so understanding about my absence and trying to make sure I understood through my ears what I did not have available on my eyes yesterday, and to thank Judy for getting the information to me that she did.

**DR. H. BEHLING:** We appreciate your patience and we certainly sympathize with having to sit there with a phone glued to your ear, so we appreciate your cooperation and willingness to participate in absentia.

**MS. MUNN:** Well, this is pretty important stuff.

**DR. H. BEHLING:** We appreciate your willingness to forfeit a few hours of sleep here.

**MS. MUNN:** Tomorrow comes sleep.

**DR. H. BEHLING:** Okay, great. Anybody else have any comments you want to add to the record?

**MR. GIBSON:** This is Mike Gibson. I'd just like to thank Wanda for being what Hans said, it's tough enough sitting here in the room let alone trying to listen with a phone glued to your ear, and for Ray, also, trying to understand this via long distance. I'd like to thank NIOSH and SC&A. I think it's been a very productive meeting. I think it's going to go a long way to help us get some of these issues resolved so we can go on and make some progress for the claimants.

**MR. HINNEFELD:** Yeah, this is Stu Hinnefeld. I would just express my appreciation for this kind of a process. I think this is certainly constructive and helpful to us and we're hopeful that our participation is

helpful to the process in general.

**DR. H. BEHLING:** Okay I guess with that we'll conclude this meeting. And I personally want to thank again, Ray, for his patience in doing something that hopefully he won't have to endure again. But we'll close this meeting as of this moment. Thank you.

(Whereupon, the proceeding was adjourned at 10:43 a.m.)

# C E R T I F I C A T E

STATE OF GEORGIA :

COUNTY OF FULTON :

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the 12th and 13th day of January, 2005; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 3rd day of February, 2005.

Steven R Green

**STEVEN RAY GREEN, CCR**

**CERTIFIED MERIT COURT REPORTER**

**CERTIFICATE NUMBER: A-2102**